STATE OF CALIFORNIA

PUBLIC EMPLOYEES' RETIREMENT SYSTEM

AUDIT OF

ELECTRONIC DATA PROCESSING OPERATIONS

OCTOBER 1971

JOINT LEGISLATIVE AUDIT COMMITTEE

VINCENT THOMAS, CHAIRMAN

ROOM 4126

STATE CAPITOL

The Honorable President of the Senate
The Honorable Speaker of the Assembly
The Honorable Members of the Senate, and
   The Assembly of the Legislature of California

Sirs:

We herewith transmit a report on the audit of the data processing
operations of the Public Employees' Retirement System (PERS) and
the Data Processing Service Center (DPSC) which is operated by the
PERS. The DPSC provides EDP services to the State Teachers' Retire-
ment System (STRS) and the Department of Veterans' Affairs (VA).

The objectives of this audit were to evaluate the effectiveness and
efficiencies of the data processing operations of the PERS and the
DPSC which have annual budgets of $880,000 and $576,000 respectively,
for the fiscal year 1971-72. The DPSC budget includes a share of
the PERS-EDP budget.

The PERS has used EDP productively and has set up a DPSC which is
one of the best examples of EDP consolidation in state government.
However, the audit identified areas of deficiency which require con-
siderable improvement.

No long-range master plan has been established to provide a founda-
tion for the effective development of management and EDP systems.
Development of the Public Employees' Retirement Management Informa-
tion System (PERMIS) has been stalled for 2½ years because of a
lack of user involvement in basic planning and development functions.

PERS does not place necessary emphasis upon internal controls. As
a result, serious control weaknesses exist in major systems that
process large volumes of data. For example, automated calculation
of retirement benefits has revealed that EDP records for 20 to 25
percent of the 400,000 active members contain significant inaccuracies
in pay rate and service credit data. In most cases, these inaccu-
racies are manually detected and corrected before payment of benefits.

The DPSC is not a fully developed and well defined EDP service organization. Similar EDP programming and key punch functions are performed outside of the DPSC by the PERS and the STRS. This results in wasteful utilization of total EDP resources.

Considerable inefficiency occurs daily in the computer processing of PERS data because programs have not been modified to allow for direct read-in of key-entry tapes. Annual savings of approximately $39,400 could be realized if the programs were modified.

In September 1971 the PERS, STRS, and VA completed a joint feasibility study which recommended that a new computer be installed by July 1972. However, the study falls short of providing adequate justification for a new computer. Projected work loads indicate that the existing computer can meet the needs of the users until July 1973 or beyond. As recommended in the audit report the PERS has agreed to defer procurement of a new computer. This will result in an annual savings of $40,000.

The DPSC reports a high level of computer utilization. However, the existing utilization reporting system is seriously inadequate and the reported utilization information is overstated by an undeterminable amount. Also, job processing costs and variances are not reported, and pressures are not imposed upon the DPSC or user organizations to critically evaluate the costs and effectiveness of EDP services provided.

As the result of a legislative request, PERS is currently participating in a feasibility study for a Fiscal and Personnel DPSC to provide services to member agencies of EDP Consolidation Group Four.

The report contains 69 recommendations including 13 major recommendations in the areas of planning, organization, systems effort, EDP controls, computer operations, and cost reporting. The PERS has concurred with all of the reported findings and has indicated positive intent to implement all recommendations. However, implementation of certain of the recommendations concerning the operations of the PERS-DPSC may not be necessary if PERS becomes a user of the planned Fiscal and Personnel DPSC (Consolidation Group Four).

Respectfully submitted,

VINCENT THOMAS, Chairman
Joint Legislative Audit Committee

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REPORT SUMMARY

WHY THE AUDIT WAS MADE

California state government currently invests approximately $83,000,000 annually for electronic data processing (EDP). The Legislature has expressed a keen interest in determining that this investment is producing the cost savings and tangible benefits associated with computer technology.

The Public Employees' Retirement System (PERS) has made a heavy commitment (18 percent of total budget) to the use of EDP in meeting its needs. In addition, the PERS supplies a large volume of computer services to the State Teachers' Retirement System (STRS) and the Department of Veterans Affairs (VA) through the operation of a Data Processing Service Center (DPSC). PERS' EDP budget for the 1971-72 fiscal year is approximately $880,000. The DPSC budget is approximately $576,000 and includes a portion of the PERS EDP budget.

The STRS requested that our office review and evaluate its planned information processing system prior to full implementation. Because the STRS receives computer services from the PERS-operated DPSC, we have performed coordinated but separate audits of the EDP operations of both STRS and PERS.

GENERAL FINDINGS

The PERS has used EDP productively and has set up a DPSC which is one of the best examples of EDP consolidation in state government. However, our audit identified five major areas of deficiency which require considerable improvement. These areas are:

- PERS future planning

- PERS and DPSC organization

- PERS systems effort

- PERS and DPSC data processing controls

- DPSC computer utilization and job and cost reporting.

We reviewed all current PERS EDP applications; however, because of the above deficiencies we elected not to audit the applications in detail. Instead, we concentrated on the major areas of deficiency which have an effect on all EDP applications processed through the computer.

No long-range master plan has been established to provide a foundation for the effective development of management systems, EDP systems, and EDP procurement.

At the request of the Legislature, PERS is currently participating in a feasibility study for a DPSC to provide computer services to member agencies of EDP Consolidation Group Four. We are concerned because the PERS has not developed internal EDP policies which are essential prerequisites to engaging successfully as a user organization in a large-scale consolidation project.

In September 1971 the PERS, STRS, and VA completed a joint feasibility study which recommended that a new Honeywell Model 4200 computer be installed by July 1972. Procurement would be on a sole-source, seven-year contract basis. Our review revealed that the study falls short of providing adequate justification for a new computer and sole-source procurement. In addition, projected workloads indicate that the existing computer can meet the needs of PERS, STRS, and VA until July 1973 or beyond.

Many problems exist in the present PERS organization which handicap the daily operation of the DPSC, the development of new systems, and further consolidation within EDP Consolidation Group Four. The problems are as follows:

- The organization is not structured to perform an effective systems effort.

- The DPSC is not a fully-developed and well-defined EDP service unit.

- Internal control of data processing is seriously inadequate, and essential internal audit functions are not performed.

- Similar EDP functions are performed by the PERS and STRS, which result in wasteful utilization of total EDP resources.

In January 1969 the PERS started development of the Public Employees Retirement Management Information System (PERMIS) to meet all of its information needs. Development of this system has been stalled for 2 1/2 years. Preliminary planning has not been completed, approvals have not been documented, budgets have not been projected, and costs have not been reported. A lack of user involvement has left a large void in the basic planning and development functions.

PERS does not place necessary emphasis upon the design of internal controls during the initial development of integrated manual and EDP systems. Serious control weaknesses and inaccuracies can and do result in major systems that process large volumes of data. For example, automated calculation of retirement benefits has revealed that EDP records for 20 to 25 percent of the active members contain significant inaccuracies in historical pay rate and service credit data. These inaccuracies are detected and corrected before payment of benefits, in most cases.

Considerable inefficiency occurs daily in the computer processing of PERS data because programs have not been modified to allow for direct read-in of input tapes from the advanced key-entry system.

The DPSC reports a high level of computer utilization. However, our review revealed that the existing utilization reporting system is seriously inadequate and the reported utilization information is overstated by an undeterminable amount. Also, individual job processing time is not reported for effective management of the DPSC.

As an added concern, no project development or application costs and variances are reported, and pressures are not imposed upon the DPSC or user organizations to critically evaluate the costs and effectiveness of the EDP services provided.

CONCLUSION

In order to provide maximum obtainable benefits to its members, the PERS should take an aggressive approach to resolving existing deficiencies in systems planning, organization, EDP internal controls, DPSC operations, and EDP cost reporting.

Positive action is necessary to make EDP a more useful and effective tool for the PERS as well as the other user departments which participate in and obtain services from the DPSC.

Development of a viable long-range master plan is an essential first step in effective planning. Internal EDP policies must be established which will assure PERS control over systems and data processing in a large-scale EDP consolidation project.

Procurement of a new computer should be delayed until July 1973 or beyond, producing an annual cost savings of approximately $40,000. When future procurement of EDP equipment is planned, competitive proposals and bids should be solicited and evaluated.

The PERS and DPSC organizations should undergo major changes in order to strengthen the PERS organization, facilitate the development of "user-oriented systems", provide for more effective DPSC, and contribute to more productive consolidation efforts within EDP Consolidation Group Four.

User control of data processing should be greatly improved and internal audit functions performed, covering all systems development and data processing.

Conversion of existing PERS programs to direct-tape-input should result in annual savings of approximately $39,400.

Development of a meaningful and accurate computer utilization and job reporting system is of utmost importance to both DPSC and user management personnel.

An effective "cost-center accounting" system is required to assure full recovery of incurred costs and equitable charging to the users.

Systems development and control within the PERS, and data processing operations within the DPSC would be greatly improved through implementation of the recommendations contained in this report. Of the 69 recommendations given in this report, PERS management should give special attention to the 13 major recommendations presented on the following page.

MAJOR RECOMMENDATIONS

The major recommendations contained in this report are listed below:

Page

1. Establish a long-range master plan for the PERS to include a comprehensive management systems plan and an EDP plan. Maintain this plan on a current basis.   13

2. Establish internal EDP policies which provide for maximum effectiveness of user controls and maximum compatibility of systems, programs, software, and data files with the future plans of EDP Consolidation Group Four. Make all future procurement of EDP equipment subject to these policies   16

4. Defer procurement of a new computer main frame until the needs of the PERS, STRS, and VA are more adequately defined and the plans of EDP Consolidation Group Four are determined.   20

5. When procurement of computer main frame, major peripheral, and telecommunication equipment is planned, solicit and objectively evaluate competitive technical proposals and bids from all qualified vendors.   20

10. Redesignate the PERMIS Committee as the Management Systems Steering Committee and assign it broader responsibility to direct all long-range planning and systems projects.   26

LISTING OF RECOMMENDATIONS

The recommendations contained in this report are listed below in the order in which they appear (* Major Recommendation).

6. Utilize a computerized simulation method to assist in
    developing detailed procurement specifications for computer
    main frame, major peripheral, and telecommunication equip-
    ment when procurement is planned.   21

7. Evaluate the potential increase in throughput and associated
    costs of replacing some of the existing computer peripherals
    with units of increased speed and/or expanding the existing
    core from 196K to 262K.   21

8. Determine the potential benefits and costs of procuring a
    9-track tape drive and control unit to provide for direct
    read/write of tapes from outside organizations. Give con-
    sideration to using this drive with the job accounting system
    and other utility applications.   22

9. Coordinate with STRS for the planned transfer of EAM work to
    the computer and the phasing out of most of the EAM equipment. 23

*10. Redesignate the PERMIS Committee as the Management Systems
    Steering Committee and assign it broader responsibility to
    direct all long-range planning and systems projects.   26

*11. Discontinue the EDP Division in its present form and establish
    in its place a Management Systems and Controls Division with
    responsibility for management systems projects, EDP systems
    analysis, training of user personnel, information security,
    user control of EDP data, internal audit, and administrative
    support of the Data Processing Service Center (DPSC).   31

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I. INTRODUCTION

We have conducted an audit of the electronic data processing (EDP) operations of the Public Employees' Retirement System (PERS). As part of this audit, we have also reviewed the Data Processing Service Center (DPSC) which is operated by the PERS to provide EDP services to the State Teachers' Retirement System (STRS) and the Department of Veterans Affairs (VA). The primary objectives of this operational audit were to evaluate the use of the EDP resources (personnel and equipment) and to determine the effectiveness and adequacy of the EDP systems and internal controls. Emphasis was given to the following:

- Future planning

- Organization structure

- Systems effort and controls

- Data processing controls

- Data processing operations

- Computer utilization

- Cost reporting and recovery.

The scope of this operational audit included the EDP requirements and operations of the PERS and the DPSC in general and those related activities which are important to effective and efficient use of EDP.

During our review, we identified five major areas needing considerable improvement. These areas are as follows:

- PERS future planning

- PERS and DPSC organization

- PERS systems effort

- PERS and DPSC data processing controls

- DPSC computer utilization, job, and cost reporting.

We believe that improvements in the above areas will lead to, and assist in, making improvements in other problem areas also identified throughout this report. Management is aware of most of the problems presented in this report, and many of our recommendations are the direct results of interviews with key personnel in the PERS user divisions, the EDP division to include DPSC personnel, and the STRS and VA user organizations which obtain services from the DPSC. A review of our findings and implementation of our recommendations, which are designed to solve the problems presented in this report, would aid in the further development of the management and EDP systems, the improved use of EDP resources, the establishment of adequate internal controls, and the reporting of accurate EDP costs. Positive action is considered necessary to make EDP a more useful and effective tool for the PERS as well as the other user departments which participate in and obtain services from the DPSC.

II. GENERAL INFORMATION

In this chapter we present general information concerning the background of the PERS, the EDP resources employed by PERS in administration of its programs, and the EDP services performed by the PERS for the STRS and VA through the DPSC. The areas covered are general background, equipment and personnel, and general applications.

GENERAL BACKGROUND

Beginning in 1932 the state created the State Employees' Retirement System to provide retirement and death benefits for its employees, other than those already covered under the State Teachers Retirement System. In 1939, coverage was extended to employees of cities, counties, school districts, and other political subdivisions of the state who wished to contract with the state system. On October 1, 1967, the system officially became known as the Public Employees' Retirement System. At present, the primary objectives and outputs of the PERS are as follows:

- To provide a retirement and death benefit program for public employers and their employees:

	Actual 1970-71	Estimated 1971-72	Proposed 1972-73
Employees covered	433,438	444,000	455,000
Monthly benefit recipients	64,185	73,800	84,600
Single benefit recipients	61,431	63,100	64,900

- To obtain social security coverage for public employers
  and their employees, in accordance with federal and
  state statutes and regulations:

	Actual, 1970-71	Estimated 1971-72	Proposed 1972-73
Employers	2,631	2,600	2,700
Employees covered	457,509	485,500	510,000

- To provide public employees and their families with adequate
  health benefit plans which are administered by public
  carriers:

	Actual 1970-71	Estimated 1971-72	Proposed 1972-73
Average monthly enrollment	206,216	308,100	396,600
Number of plans	21	21	21

- To provide effective investment management of the retirement
  fund on a long-range basis.

- To provide management of the Legislators' Retirement program.

The actual expenditure for administering the PERS programs was
$4,568,261 (unaudited) for the fiscal year 1970-71, and the budget for 1971-72
is $5,199,158. Of these amounts, the actual expenditure for EDP support of
the PERS programs for 1970-71 was $841,172 (unaudited), and the estimated
expenditure for 1971-72 is $871,960. These amounts include the cost of
services received from the DPSC and the Department of Water Resources, but
do not include the cost of services provided to the STRS and VA.

The current expenditure level for EDP support represents approximately 18 percent of the total PERS administrative budget. This clearly indicates that the volume of transactions has required the management of PERS to place heavy reliance on EDP to process data accurately and on a timely basis. The magnitude of the EDP expenditures and the heavy workload make it imperative that management of EDP resources be dynamic and effective.

Since July 1968, the PERS has operated a DPSC within its EDP division to provide for its own computer processing needs and the needs of the STRS and VA. The total cost (unaudited) and cost distributions for operating this center are as follows:

	Actual 1970-71		Estimated 1971-72	
STRS	$130,000	(23%)	$134,810	(23%)
VA	45,600	(8%)	66,176	(12%)
PERS*	379,518	(69%)	375,154	(65%)
Total	$555,118	(100%)	$576,140	(100%)

*The cost distribution to the PERS is included within the expenditures for EDP support of the PERS programs discussed on the previous page.

EQUIPMENT AND PERSONNEL

The EDP division currently operates within the DPSC a Honeywell, Model H2200 (core size - 196,000 characters) computer having multiprogramming capability. This computer is a general-purpose, third-generation digital computer designed for medium scale applications. Peripheral equipment includes five disk drives (capacity - 175,000,000 characters), eleven tape drives, two printers, one card reader, and one card punch-reader. In

addition, the EDP division owns and leases some electrical accounting machine (EAM) equipment which is operated by the STRS in providing services to the PERS and the STRS.

In October 1970, the EDP division had installed a Computer Machinery Corporation (CMC), Model 9, key-entry system with twelve keystations. This sophisticated system affords a keyboard-entry method of preparing input data for direct recording on a magnetic disk unit. Completed batches of verified data are transferred from disk to tape prior to computer processing. This high capacity system is currently used to provide for the needs of the PERS only and is not incorporated within the DPSC operations.

The total annual lease and maintenance costs for EDP equipment operated within the PERS keyprocessing operation and the DPSC are as follows:

EDP Equipment	Actual 1970-71	Estimated 1971-72
H2200 Computer	$244,152	$270,799
EAM	3,356	2,697
Key data	23,724	34,114
Maintenance	10,932	4,000
Total	$282,164	$311,610

During the 1970-71 fiscal year, the EDP division had 54 authorized permanent positions, but employed the services of 59 equivalent positions in order to provide for overtime work and the use of temporary help. This was the result of a heavier than expected EDP workload during the year. The personnel costs, including staff benefits, within the EDP division may be readily classified into the categories on the following page, which are in direct support of PERS and DPSC work.

PERS-EDP Personnel	Actual 1970-71	Estimated 1971-72
Administration	$ 20,995	$ 28,536
Systems and programming	169,569	214,037
Controls	31,447	33,584
Keyprocessing	85,965	87,368
Temporary help	16,828	6,000
Staff benefits	34,962	40,632
Less 3% salary savings		(10,906)
	359,766	399,251

DPSC Personnel		
Administration	$ 29,038	$ 29,546
Software and procedures	27,202	22,584
Computer operations	142,677	154,597
New positions	-	38,446
Temporary help	6,001	6,000
Staff benefits	22,970	27,632
Less 3% salary savings	-	(7,355)
	227,888	271,450
	$587,654	$670,701

GENERAL APPLICATIONS

In this section we discuss the general EDP applications of the PERS, STRS, and VA which are currently processed or under development.

(a) PERS Applications

The general applications areas and certain of the specific applications presently processed by the EDP division and the DPSC for the PERS are as follows:

- Membership division

    -- Active member record file

    -- Active member statistics file

    -- Active member receivable file

- Benefits division

    -- Retirement benefit calculation

    -- Retirement benefit payment roll

    -- Deductions master file

    -- Retired member statistics files

- Investment unit

    -- Investment transactions

    -- Investment portfolio

    -- Dealer file

- Actuarial unit

    -- Actuarial investigations and valuations

    -- Evaluation of proposed legislation

    -- New agency studies and contract modifications

- Accounting division

    -- Payroll contributions and audits

    -- Retirement system accounting for reserves,
       investments, receivables, liabilities, etc.

    -- Terminations and other refunds

- Health benefits division

    -- Employee and dependent master file

    -- Premium payments for public agencies

- Social security division

    -- No current EDP applications

- Administrative division

    -- Billing of public agencies for administrative costs

    -- Special work on request.

The following new systems are currently under development or are planned for development in the near future:

- Benefits division - retired member system, to interface with health benefits and accounting systems.

- Membership division - active member system, to interface with accounting systems.

- Investment unit - amortization of bond gain and loss system.

- Accounting division - reserve accounting system.

- Actuarial unit - revised actuarial investigation and valuation programs.

- All divisions - data base study.

- EDP division - revised programs to accept direct tape input from the keyentry system. Job accounting and tape library control systems.

In the course of our audit, we reviewed all current PERS applications. However, because of the existence of major deficiencies in systems planning, user controls, and data processing controls, we elected not to audit the applications in detail. Instead, we placed major emphasis on planning, organization, internal controls, and operational practices which have an effect on all applications processed through the computer.

(b)   STRS and VA Applications

The general applications presently processed by the DPSC for the STRS and VA are as follows on the next page.

- STRS

    -- Member records and statistics

    -- Member benefits

    -- Investments

- VA

    -- Farm and home loan accounting

    -- Management and statistical reports

    -- Fiscally related services.

A review of the STRS and VA applications was not conducted as part of this audit. However, a separate audit review of the EDP applications and operations of the STRS was conducted concurrently with this audit of the PERS EDP operations and is reported in a coordinated but separate audit report.

III. FUTURE PLANNING

The existence and effectiveness of future planning in the areas of EDP systems and related management systems were of primary concern to us in our audit. In this chapter we present our findings and recommendations in the areas of the PERS master plan, EDP Consolidation Group Four, and EDP equipment procurement plan.

PERS MASTER PLAN

As a major step in future planning, the PERS established in January 1969 a long-range goal for development of the Public Employees' Retirement Management Information System (PERMIS). This advanced systems concept calls for the development of a computerized management information system designed to provide for the expanding information needs of the retirement system, participating employers, and individual members. The original plan incorporated a concept of integrated data base files and a direct access telecommunication system to provide for the needs of nine subsystems and files as follows:

- Active member system

- Retired member system

- Investment portfolio system

- Actuarial valuation system

- Retirement and fund accounting system

- Budget accounting system

- Administrative and personnel files

- Retirement legislation files

- Agency contract files.

In addition to the subsystems and files on the preceding page, the PERMIS concept was also expanded to allow for improved systems for the Health Benefit, Social Security, and Legislators' Retirement programs which are administered by the PERS.

Full development and activation of the PERMIS was originally scheduled for completion by December 1971. As a part of the plan, increased computer capacity and advanced data base and telecommunication features were also to be made available to the STRS.

Our review of the present status and past accomplishments of the PERMIS project reveals that development of the system has been stalled in the conceptual stage for 2 1/2 years with the exception of the development of applications for the calculation of retirement benefits and the consolidation of payroll data. Preliminary planning has not been completed or kept current, schedules have not been revised, budgets have not been projected, and costs have not been reported. As a primary constraint, the planning and development work to date has been EDP-oriented rather than user-oriented. An attempt to define user requirements was recently initiated, and a lack of user involvement has left a large void in the basic planning and development functions.

The PERMIS project represents the only visible long-range planning effort within the PERS. No master plan of an all-encompassing nature has been established to provide a foundation for the effective development of management systems, EDP systems, and EDP equipment procurement.

The development of a viable long-range master plan is an essential requisite for the PERS to accommodate the steadily increasing retirement and health benefit demands of its members and at the same time achieve greater administrative efficiencies.

A long-range master plan should be established in the most simple but most effective form, providing planning projections for at least five years into the future.

This plan should present clear statements of overall objectives and goals of the PERS and be sufficiently detailed to provide top management and operating management with a basic plan of action in the areas of management systems, EDP systems, EDP equipment procurement, staffing, and budgets. The plan should be updated and revised annually, or when required, in order to make it an effective working document. Sufficient alternatives should be included in the plan to provide for flexibility in meeting the requirements of new legislation.

MAJOR RECOMMENDATION

*1.   Establish a long-range master plan for the PERS
       to include a comprehensive management systems
       plan and an EDP plan. Maintain this plan on a
       current basis.

EDP CONSOLIDATION GROUP FOUR

As a first step in implementing a viable long-range EDP consolidation plan for optimum utilization of computer systems, the state has established seven EDP consolidation groups.

EDP Consolidation Group Four (fiscal and personnel) is composed of the Public Employees' Retirement System (PERS), State Teachers' Retirement System (STRS), Department of Veterans Affairs (VA), Franchise Tax Board, Secretary of State, State Personnel Board, State Controller, and State

Treasurer. The only consolidation accomplished within this group to date

has been the joining together of the PERS, STRS and VA in the use of one

data processing service center which is operated by the PERS.

In an effort to stimulate further consolidation in this group, the

Supplementary Report of the Committee on Conference Relating to the Budget

Bill, 1971-72 Fiscal Year, Item 47, State Controller, included the following

recommendations:

> "Any planning for a new electronic computer system or
> improved data processing service for the State Controller
> be completed in cooperation with EDP Master Plan Consoli-
> dation Group IV. It is further recommended that the
> State Treasurer, State Personnel Board and any other
> fiscal or personnel agency requiring data processing
> service be considered as prime customers of a State
> Controller data processing service center in order to
> reduce duplication of fiscal and personnel systems and
> to insure full utilization of any proposed new computing
> equipment.
>
> "If the Controller intends to request funds for new
> computer equipment in the 1972-73 budget, he shall make
> available to the Joint Legislative Budget Committee prior
> to the commencement of the 1972 legislative session the
> results of feasibility studies, systems' plans, and
> evidence that the above recommendation has been considered
> and implemented."

In response to these recommendations the State Controller in a letter

dated August 4, 1971 solicited the cooperation of the State Personnel Board,

State Treasurer, PERS, STRS, and VA in planning for a consolidated data

processing facility. Subsequently, a planning workshop was conducted in

Santa Rosa on September 27 and 28, 1971, with the stated objectives of

developing the following:

- A general concept of a data processing service

  center which would meet the needs of all of the

  prospective member departments.

-       A general plan for implementing such a center.

General concurrence was reached at this workshop by all partici-
pating departments that potential benefits merited development of a data
processing service center. However, there were strong arguments that the
organizational structure and placement of the center should be decided
upon only after a feasibility study is performed and evaluated.

As a result, a feasibility study has been initiated with comple-
tion scheduled on January 31, 1972. Funding for this study has been set
at $30,000 with a prorating of costs between the departments. The primary
goals of this study effort are as follows:

-       Determine current and projected user needs

-       Determine statutory and practical constraints

-       Establish alternatives for consolidation, showing
        costs and benefits

-       Determine organizational placement of the DPSC

-       Develop an implementation plan.

Further consolidation within group four appears to be inevitable
and advantageous to the state and the participating departments. However,
further consolidation should be undertaken only as the result of adequate
planning and controlled implementation.

During the course of our audit we have become concerned that the
PERS has not developed internal EDP policies which are essential prerequi-
sites to engaging successfully in a large-scale consolidation project as
a user organization. At present the PERS approach to data processing is

"EDP hardware" - oriented rather than "user applications" - oriented. In addition, there is no available evidence that positive steps are being taken to provide a progressive level of compatibility of systems, programs, software, and data files with the future plans of EDP Consolidation Group Four.

Future consolidation may follow any one of a number of alternate plans. But no matter what plan is selected, the PERS must set primary EDP policies for establishing and maintaining effective user control over systems and data processing, looking to the DPSC for services only.

In addition, as long as a DPSC is operated by the PERS, internal EDP policies should be established which provide for maximum compatibility of systems, programs, software, and data files with the future plans of Consolidation Group Four.

These policies should serve as a basis for future procurement of EDP equipment.

MAJOR RECOMMENDATION

*2.   Establish internal EDP policies which provide for maximum effectiveness of user controls and maximum compatibility of systems, programs, software, and data files with the future plans of EDP Consolidation Group Four. Make all future procurement of EDP equipment subject to these policies.

One of the alternatives currently under study for effecting increased EDP consolidation allows for operating two or more data processing service centers on an integrated basis with common interface points for systems and data transfer. If this alternative is selected and the DPSC which is presently operated by the PERS continues to exist for a future period of several years, an investigation should be made of the practicality and potential benefits of consolidating with the Department of Water Resources (DWR) on a single computer main frame serving the needs of the PERS, STRS, VA and DWR.

Presently, the PERS and the DWR operate computers side by side within the same room without sharing any common equipment. The workload on the DWR computer has been decreasing while the workload on the PERS computer has been increasing. Therefore, consolidation appears to be advantageous and feasible because duplication of operating crews could be eliminated and the available space could be used to accommodate a single computer main frame which could accommodate the "accounting-oriented" processing requirements of the PERS, STRS, and VA and the "engineering-oriented" processing requirements of the DWR.

RECOMMENDATION

3. As an alternative to a total consolidation within EDP Consolidation Group Four, investigate the practicality and potential benefits of future consolidation with the Department of Water Resources (DWR) on a single computer main frame serving the needs of the PERS, STRS, VA, and DWR.

EDP EQUIPMENT PROCUREMENT

In September 1971, the PERS, STRS, and VA completed a joint
feasibility study for upgrading to a new computer main frame of increased
capacity and growth potential. This study recommended that a Honeywell
Model 4200 computer be installed by July 1972, replacing the existing
Model 2200. Procurement would be based upon a sole-source, lease/
purchase contract over a period of seven years.

Justification for procurement of a new computer on a sole-source,
long-term contract basis was given as follows:

> "The model H4200 configuration is recommended because
> it provides at reasonable costs the capabilities
> needed to meet the short range requirements of the
> Center and because it also provides the potential
> modular growth for the long range requirements.
> Recognizing that departmental long range plans
> must also interface with Statewide Long Range Plans
> for E.D.P., this model H4200 does provide all of the
> potential growth requirements that may be dictated
> by the proposed use of communications and direct
> access to large data base files."

In support of this statement of justification, the study pointed out
that only Honeywell equipment would be considered in order to minimize program
and software conversion costs.

Our evaluation of the feasibility study and the recommendation for
procurement of a new computer revealed that the study falls short of pro-
viding adequate justification for a new computer and sole-source procurement.

The projected workloads presented in the report indicate that the
existing computer can meet the data processing needs of the PERS, STRS, and

VA until July 1973, especially if operational improvements as recommended in this report are implemented to increase efficiencies and throughput.

Deferral of procurement plans until July 1973, would enable the PERS, STRS, and VA to more adequately define future needs, develop new EDP system concepts, and establish consolidation plans with other departments in EDP Consolidation Group Four.

Expected savings from deferral of computer procurement until July, 73	Annual cost
Proposed Honeywell 4200 computer	$294,000
Existing Honeywell 2200 computer	254,000
Expected savings in fiscal year 72-73	$ 40,000

Sole-source procurement of a new computer main frame on a long-term, seven-year contract would be a questionable move which would not take advantage of potential technical benefits and cost savings which may be available through receiving competitive proposals and bids.

In order to obtain maximum assurance that full benefits are obtained from the highly competitive EDP equipment market, the PERS, STRS, and VA should jointly solicit and objectively evaluate competitive proposals and bids from all qualified vendors. This should be done whenever procurement of computer main frame, major peripheral, and telecommunication equipment is planned. For purposes of valid evaluation, all bids should be adjusted for realistic conversion and training costs as a means of determining total cost.

This matter has been reviewed with PERS, STRS, and VA at the time of this report, and agreement has been reached that procurement of a new computer main frame will be deferred during fiscal year 72-73.

MAJOR RECOMMENDATIONS

*4. Defer procurement of a new computer main frame
until the needs of the PERS, STRS, and VA are
more adequately defined and the plans of EDP
Consolidation Group Four are determined.

*5. When procurement of computer main frame, major
peripheral, and telecommunication equipment is
planned, solicit and objectively evaluate com-
petitive technical proposals and bids from all
qualified vendors.

In recent years several agencies have utilized a computerized
simulation method for the purpose of determining complex procurement
specifications for new computer systems (hardware and software) and
evaluating the effectiveness of any proposed computer system in meeting
the specifications. These simulations have been conducted with a special
software package on the IBM 360/50 computer operated by the Department of
General Services.

Current experience has demonstrated that this simulation method
is an effective tool for design of information systems and evaluation of
computer hardware and software in a complex multiprogramming environment.
Without a powerful simulation method, an effective computer system design
and evaluation effort would be very difficult and prohibitively costly if
manual methods were employed.

RECOMMENDATION

6. Utilize a computerized simulation method to assist in
    developing detailed procurement specifications for
    computer main frame, major peripheral, and tele-
    communication equipment when procurement is planned.

The existing Honeywell 2200 computer configuration includes some
peripheral units that are slow in performing input and output functions.
As an added concern, the central processing unit (CPU) has a core capacity
of 196K characters, which limits multiprogramming partition size to approxi-
mately 64K characters. This imposes restrictions on program sizes, which
complicates program design work and necessitates additional processing steps.

Even though current projections indicate that the existing computer
configuration can accommodate data processing requirements until July of
1973, a thorough evaluation of peripheral units and core capacity should be
made to determine whether throughput can be increased with favorable cost/
benefits by acquiring peripheral units of increased speed and/or expanding
core capacity by the next increment from 196 to 262K characters.

Upgrading the existing computer may also provide a means for the
continued utilization of this computer main frame beyond July 1973.

RECOMMENDATION

7. Evaluate the potential increase in throughput and
    associated costs of replacing some of the existing
    computer peripherals with units of increased speed
    and/or expanding the existing core from 196K to 262K.

At present, computer processing of data is performed with 7-track tape files and drives. However, a steadily increasing number of 9-track tape files are being received from and returned to outside public agencies that are associated with the PERS, STRS, and VA. These tapes must be converted to 7-track by the Franchise Tax Board prior to processing on the PERS H2200 computer. Conversion is done on a "no cost" basis, but adverse delays are often encountered.

As a related concern, the automated recording of computer job accounting information on the H2200 has been stalled because of continuing problems with the Honeywell operating system (software) and the lack of an additional tape drive for utility purposes.

In addition, the VA is planning to convert from keypunch machines to key-tape units, which would output 9-track tapes to the computer, thereby converting all of its processing to 9-track. This appears to be a proper step for increasing control with a remote DPSC and reducing time required for data preparation and computer processing.

RECOMMENDATION

8. Determine the potential benefits and costs of procuring a 9-track tape drive and control unit to provide for direct read/write of tapes from outside organizations. Give consideration to using this drive with the job accounting system and other utility applications.

The PERS presently obtains electrical accounting machine (EAM) services from the STRS. This EAM processing work is performed on equipment which is owned or leased by the PERS and the STRS. The majority of this work can be more efficiently and quickly performed on the H2200 computer if application programs are written.

Both the PERS and the STRS have set tentative target dates for conversion of this work to the computer, phase out of EAM equipment, and transfer of EAM operators to computer operations. However, an aggressive effort to implement this conversion has not been started.

A more detailed discussion of EAM processing work and potential cost savings in this area is presented in a separate audit report of the STRS-EDP operations.

RECOMMENDATION

9. Coordinate with STRS for the planned transfer of EAM work to the computer and the phasing out of most of the EAM equipment.

IV.   ORGANIZATION

An effective organizational structure is essential in order to derive maximum benefits from EDP resources. The PERS places heavy reliance upon the EDP organization to develop new systems and process data accurately and on a timely basis. These demands are even more intensified in meeting the requirements of operating a DPSC and in working toward further consolidation within EDP Consolidation Group Four.

In this chapter we present our findings and recommendations concerning our proposed major revision in the organizational structure of the PERS and the DPSC. We feel that implementation of these recommendations will strengthen the PERS organization, facilitate the development of new systems, provide for a more effective DPSC, and contribute to more productive consolidation efforts within EDP Consolidation Group Four.

PRESENT ORGANIZATION

Currently the PERS consists of the following four staff units and seven divisions reporting through two Assistant Executive Officers to the Executive Officer:

- Staff units

  -- Actuarial

  -- Investment

  -- Legal

  -- PERMIS Committee

- Assistant Executive Officer, Retirement Program

  -- Membership Division

  -- Accounting Division

  -- Benefits Division

- Assistant Executive Officer, Administration and Other Programs

  -- Administration Division

  -- EDP Division

  -- Social Security Division

  -- Health Benefits Division.

The EDP division, as shown on the facing page, includes two sections and one staff group as follows:

- Systems and programming section

- Data processing service center (DPSC)

- PERMIS staff group.

MANAGEMENT SYSTEMS STEERING COMMITTEE

In January of 1971 the Executive Officer of the PERS established a PERMIS Committee composed of all of the assistant executive officers and division managers to direct the development of the PERMIS project. Since formation this committee has initiated a renewed effort to define PERMIS, survey user needs, establish goals, and work toward a re-established development and implementation schedule. However, progress has been limited and disappointing to the members of the committee.

The poor rate of progress can be attributed to the fact that the committee's responsibilities are limited to the PERMIS project and the absence of a "user-oriented" systems organization to effect action on behalf of the committee.

In conjunction with our proposed changes in organizational structure, which are presented in sections to follow in this chapter, we feel that the committee should be assigned broader responsibilities, as follows:

- Assist the Executive Officer in establishing objectives, goals, and policies which may be used as a basis for a long-range PERS master plan.

- Direct and review the efforts of the proposed Management Systems and Control Division in the study, development, and implementation of new management and EDP systems projects.

- Request and evaluate management, operational, internal control, and security audits, taking action as required.

A redesignation of this committee as the Management Systems Steering Committee appears to be appropriate with the assignment of increased responsibilities.

MAJOR RECOMMENDATION

*10.   Redesignate the PERMIS Committee as the Management Systems Steering Committee and assign it broader responsibility to direct all long-range planning and systems projects.

MANAGEMENT SYSTEMS AND CONTROLS DIVISION

Up to this time the basic organizational structure of the PERS and the EDP division has worked with reasonable effectiveness in providing EDP

services to the PERS, STRS, and VA. However, many problems exist in the present PERS organizational structure which handicap the daily operation of the DPSC, the development of new systems, and further consolidation within EDP Consolidation Group Four. These problems are as follows:

- The PERS organization is not structured to perform an effective systems effort, and the existing systems effort is "EDP-oriented" rather than "user-oriented".

- The PERS does not presently possess organized user control of systems and data processing and adequate resources to effectively engage in a productive con- solidation effort with EDP Consolidation Group Four.

- The DPSC is not a fully developed and well defined unit.

- Similar EDP functions are performed by the PERS and STRS, which result in wasteful utilization of total EDP resources.

- Internal control of data processing is seriously inadequate, and an essential internal audit function is not performed.

- Internal security provisions are lacking.

- An ongoing systems and EDP training program has not been organized.

In order to correct these major deficiencies, a major restructuring of the organization is necessary. This restructuring should provide for discontinuance of the EDP division in its present form and the establishment of a new Management Systems and Controls Division responsible for the following:

- PERS master planning

- Management analysis and systems projects

- EDP systems analysis

- Training of systems and user personnel

- User control of data processing

- Information security

- Internal audit

- Administrative support of DPSC

- Representing the PERS in meetings with EDP control agencies.

In meeting these responsibilities, the proposed new division should be organized into a structure as shown on the facing page. These designated units should be assigned duties as outlined below:

(a) Management and EDP Systems Section

    1. Management systems analysis and control group

This group should be composed of experienced management analysts and key personnel drawn from user divisions, working on a "task force" basis and performing the following basic functions:

- Establish and maintain a PERS master plan.

- Obtain approvals from the users and the Management Systems Steering Committee for all systems projects.

- Provide leadership in systems studies and projects, assuming responsibility for analysis, design, implementation, follow-up, revisions, and reporting of development costs.

- Establish and coordinate user training programs.

- Establish and enforce information security provisions.

- Establish and maintain systems, training, and information security standards.

2. EDP systems group

This group should be composed of EDP systems analysts who are currently working in the EDP division. The functions of this unit would be as follows:

- Design EDP systems applications as directed by the management systems analysts.

- Provide detailed program design specifications to the DPSC for conversion into written programs.

- ·Review written programs and monitor testing and system activation. Approve all revisions and monitor programming costs.

- Assist the DPSC in preparation of EDP equipment studies, procurement specifications, and evaluation of bids and proposals.

- Represent the PERS in meetings with EDP control agencies and EDP Consolidation Group Four.

(b) User Control and Scheduling Unit

This unit should be composed of an experienced supervisor and data control clerks performing the following functions:

- Provide the DPSC with annual, quarterly, and monthly projections of PERS data processing requirements.

- Provide the DPSC with weekly and daily schedule input
and revisions.

- Resolve all conflicts regarding priorities.

- Control all input data transferred to the DPSC.

- Review, balance, and distribute all output data
to the users.

- Approve the "scratching" of tape files.

The primary responsibilities for preparation of input data and the final balancing and correction of output data should be retained as user responsibilities.

(c) Internal Audit Unit

This unit should be composed of a senior internal auditor and an internal auditor experienced in internal control and EDP auditing techniques. Their functions should include the following:

- Test existing systems for internal controls. Test
data for validity and accuracy.

- Participate in development of control features for
new management and EDP systems.

- Determine compliance with legislation, policy,
standards, and procedures.

- Perform special management, operational, and
security audits.

- Develop and employ special EDP techniques for auditing
through the computer.

- Maintain liaison with field auditors.

This unit should initially be assigned to the Management Systems and Controls Division in order to become closely associated with the development of new systems. After gaining experience, consideration should be given to reassigning this unit as an independent staff unit reporting directly to the Executive Officer.

(d) DPSC

This unit should report only administratively to the Management Systems and Controls Division. Detailed discussion concerning this unit is presented in the next section.

MAJOR RECOMMENDATION

*11. Discontinue the EDP Division in its present form and establish in its place a Management Systems and Controls Division with responsibility for management systems projects, EDP systems analysis, training of user personnel, information security, user control of EDP data, internal audit, and administrative support of the Data Processing Service Center (DPSC).

RECOMMENDATION

12. Assign personnel from user divisions, on an "as required" basis, to work in "task force" groups within the proposed Management Systems and Controls Division.

DATA PROCESSING SERVICE CENTER STEERING COMMITTEE

The DPSC was established in July 1968, and since that time it has been managed and operated by the PERS, with the STRS and VA participating in the areas of decision which affect only their related needs. This arrangement has been practical and reasonably responsive to the needs of all of the concerned departments during the first three years of operating the center. However, with the development of more sophisticated EDP systems and the utilization of more advanced computer equipment, a more effective approach to the management and operation of the DPSC is necessary. This approach should provide for a stronger and more independent DPSC which is jointly controlled by the user departments.

As a positive step toward more effective control, administrative support in the areas of budgets, personnel, and facilities should continue to be provided by the PERS, but long-range planning and overall technical direction should be assigned to a DPSC Steering Committee. This committee should be composed of five members from the user departments (two members from the PERS, two members from STRS, and one member from the VA) with a chairman designated on a rotating basis.

This committee should report to the executive officers of the user departments and establish policy and provide direction for the manager of the DPSC.

The responsibilities of this committee should include the following:
- Review and approve all new requests for EDP services or major changes in existing requirements.

- Determine priorities, resolve conflicts, and review progress of major projects.

- Determine and report proposed and actual costs to the user departments.

- Review and approve major EDP equipment changes or acquisitions following coordination with user departments.

- Establish and maintain communications with EDP Consolidation Group Four.

- Evaluate performance of the DPSC.

MAJOR RECOMMENDATION

*13. Establish a DPSC Steering Committee comprised of members from the PERS, STRS, and VA. Assign responsibility for determining operating policies and providing overall technical direction of the DPSC to this committee.

DATA PROCESSING SERVICE CENTER

At present the DPSC is organized, as shown on the facing page, to provide only computer processing services to the PERS, STRS, and VA, while programming, data control, and data entry are performed separately by the user departments. This arrangement has met the needs of the users to date, but it is evident that the commonality of the PERS and STRS programs, input data, and EDP files provides ample justification for increased consolidation in order to achieve more effective utilization of total available EDP resources.

The consolidation of the total EDP resources of the PERS, STRS, and VA would be an ideal goal; however, our evaluation has revealed that the VA

should retain separate programming, control, and key-entry capabilities because it is not in close proximity with the center. Control may be reduced rather than improved if its EDP activities were further consolidated with the DPSC.

As a result of our review of the overall EDP activities of the PERS and the STRS, we feel that restructuring of the DPSC should be made in order to provide consolidated programming, processing controls, EDP training, key-entry operations, EAM operations, and cost-center accounting services to both major user departments. As an approach, our proposed organizational structure is shown on the facing page.

Programming and Software Unit

In the case of the PERS and STRS, the programming units should be combined within the DPSC in order to eliminate similar activities and to provide increased capacity to meet the heavy programming requirements of developing closely related, advanced systems. This combination should provide considerable benefits to both departments because some programs can be written to meet the needs of both users. In addition, a combined organization will provide increased flexibility in the use of personnel.

This unit should also include the software group which is currently in the DPSC in order to provide for a close, working relationship between the programmers and the software specialists. In addition, the software group should be given the additional responsibilities for coordination of EDP training and development of new EDP equipment and processing techniques.

In conjunction with the consolidation of programming resources, the PERS should transfer the programmer position currently within the Actuarial

Unit to the DPSC in order that programming support can be better provided to the actuaries and to others as required.

Processing Control Unit

At present the DPSC performs a scheduling and EDP procedure writing function for all of the users. However, the control of input and output data is fragmented and inadequate with no specific assignments in this area. As an added concern, the tape library is loosely maintained by the computer operators, and written operating standards are, for the most part, out of date because the software unit has had no time to accomplish necessary updating.

It is essential that the DPSC establish a processing control unit which will effectively perform the following functions:

- Long-term and short-term scheduling

- Processing control of input and output data and assembly of job packages

- Control of the tape library

- Writing and updating of standards and procedures

- Reporting of job costs and computer utilization.

Processing Operations Unit

The existing computer operations group should be expanded to include the EAM operations of the STRS. In addition, the PERS key-entry and the STRS keypunch groups should be combined into a single key-entry group within the DPSC.

Placement of the EAM operations within the center will permit the cross-training of EAM operators on the computer and facilitate the planned phase-out of EAM equipment.

Consolidation of the key-entry and keypunch operations into the center will provide both major user departments with services from the advanced key-entry system while increasing the utilization of this system, and possibly decreasing the number of key-entry operators required in the future.

MAJOR RECOMMENDATION

*14. Restructure the organization of the DPSC to provide the following additional EDP services to the user departments: applications programming, EDP training, processing controls, key-entry operations, EAM operations, and cost-center accounting.

EDP Training

Up to the present time the DPSC has relied primarily upon training courses provided by the EDP equipment manufacturers and, to a limited extent, upon generalized training courses sponsored by the OMS. However, the manufacturers' courses are usually presented in San Francisco, resulting in lost time on the job and travel expenses. In addition, the OMS courses have been discontinued.

In effect, training in the past has been minimal, with some individuals receiving no formal training, and there is no current, ongoing training program. The responsibility for the coordination of EDP training has not been assigned, and adequate training records are not maintained.

In order to assure that the effectiveness of its EDP personnel is
continuously improved, the DPSC and the user organizations should jointly
establish a systematic and ongoing EDP training program. Centralized
responsibility for coordination and administration of the program should
be assigned to the DPSC software group because of its close association with
new software and hardware developments.

As a primary approach to future training, the DPSC and the user
organizations should greatly increase the scope of in-house training in
order to reduce tuition and travel expenses to only that which is necessary
and to minimize interruptions of work schedules. In-house training should be
facilitated through the preparation of training plans, study guides, training
procedures, training schedules, and the selection of training advisors.

As a means of quickly and effectively implementing an in-house
training program, the DPSC and the users should jointly investigate the use
of videotaped courses which are now available for generalized and specific
training. Other EDP organizations within the state have recently started to
use these courses with satisfactory results. Contacts should be made with
these organizations in order to gain maximum benefits from their experiences,
and also to coordinate an exchange of course materials and possible joint use
of a video-camera for preparation of special in-house courses.

RECOMMENDATIONS

    15.   Establish an ongoing EDP training program for DPSC
and user personnel.

    16.   Investigate the use of videotaped lecture courses to
provide "in-house" EDP training for DPSC and user personnel.

Special recognition should be given to the PERS key-entry group for its well developed training program for operators of the new key-entry system. This program has proved to be very effective in the rapid development of new candidates into qualified operators.

Work Shift Staffing

During the last year the computer operations group has been working almost continuous overtime on weekends. Some operators have voluntarily carried a heavy workload while others have accepted only occasional overtime work. At times only one operator has been available to operate the computer on a weekend shift, which is contrary to good safety and control practices.

To rectify these conditions, the computer operations group and the proposed processing control units should be placed on a continuous three-shift, seven-day work week and staffed accordingly.

As an added concern, we observed that a systematic plan for the work-shift rotation of computer operations personnel is not in effect. Personnel are assigned to a shift on a basis of seniority preference. Little opportunity is afforded the supervisors and operators to gain experience on the other shifts.

The work shift scheduling of computer operations personnel should include the periodic rotation of supervisory and operator duties so that responsibility for running specific programs and training of new operators is not continuously in the hands of one person or group. This is essential to assure more effective internal control in data processing as well as maximum growth in the capabilities and experience of individual supervisors, operators, and trainees.

RECOMMENDATIONS

17. Place the DPSC computer operations and the proposed processing control groups on a continuous three-shift, seven-day work week.

18. Establish a systematic shift rotation plan for all computer operators and shift supervisors.

V. SYSTEMS EFFORT

An effective systems effort is very important to the PERS in developing needed operating and management information systems and in attaining productive use of available resources. In this chapter we present our findings and recommendations in the following areas:

- Management Systems Analysis

- EDP Systems Analysis

- EDP Programming

- Software Support

Our discussions in the area of management systems analysis are, for the most part, general in nature. For additional information we wish to refer the reader to a more detailed discussion of systems in the separate audit report of the STRS data processing operations. In the STRS report, the chapter on Systems Effort presents the essential elements of sound systems management which are also directly applicable to the PERS.

MANAGEMENT SYSTEMS ANALYSIS

As discussed in the previous chapter, the PERS needs to develop an effective systems management organization in order to fill the existing void in this area.

In our review of the systems effort which has been applied to the PERMIS program, we observed that many major deficiencies exist which have handicaped progress. These deficiencies are as follows:

- Effective administrative controls, to include a system of review and approval, have not been established for all systems projects.

- Systems development standards, procedures, and documentation are presently inadequate or non-existent.

- A systematic and productive effort for planning, development, implementation, and evaluation of manual and EDP systems has not been organized.

- Adequate and effective internal controls are not incorporated in the design of new systems.

- Systems projects are not effectively directed, progress is not adequately reported, and development costs are not charged and reported directly to the users.

(a) Approval Procedure

A total systems approach should be established on a solid foundation of management and user reviews and approvals. At present there is no formal approval procedure used by all of the users for initiation of systems requests. In our review of the systems documentations we found many instances in which the requests were missing, essential information was missing, or the approvals to perform the work were missing.

We believe that a formal approval procedure is needed to encompass all systems projects. Through use of such a procedure all systems requests would be evaluated as to their overall contribution to the objectives of the PERS, and meaningful priorities would be established. Outlined below is our recommended procedure for originating and approving systems projects and EDP applications:

- Require the users to submit requests describing the requested services and expected benefits to

the proposed Management Systems and Controls
Division for preliminary evaluation of the request,
formulation of appropriate systems concepts, and
estimation of costs and resource requirements.

- Require the proposed Management Systems and Controls
  Division to make recommendations regarding the users'
  request to the proposed Management Systems Steering
  Committee, and obtain the committee's approval prior
  to starting development of the project.

- Require that all major systems revisions are approved
  by the committee and the users; and that all detail
  revisions to systems, EDP programs, and procedures
  are approved by the users.

MAJOR RECOMMENDATION

*19. Develop a formal approval procedure which requires
     the proposed Management Systems and Controls Divi-
     sion to evaluate user requests, to make recommenda-
     tions regarding the requests to the proposed
     Management Systems Steering Committee, and to obtain
     the approval of the committee prior to proceeding
     with the development of systems projects.

(b) Systems Standards and Procedures Documentation

As a guide to EDP systems work, the EDP Division has provided some
standards and procedures in this area. However, these standards and procedures
are very general in nature, and it is evident that they do not serve as working
guidelines for daily systems work.

As an added concern, systems documentation is either inadequate when compared with good documentation standards or inconsistent from one project to another. The EDP division does maintain a file for its systems documentation; however, adequate security controls have not been established to provide protection for important documentation for which there are no backup copies.

Effective working standards and procedures should be established and utilized for planning, developing, implementing, and evaluating systems projects. The standards and procedures should provide control and identify the steps required to ensure completeness and thoroughness of all manual and EDP systems projects. The analysts would then have a more systematic approach to the conduct of their studies, and could be evaluated on the basis of compliance with the procedures as well as the effectiveness of the product of their work.

In conjunction with the development of effective systems procedures, the PERS should use systems checklists to assure that the analysts perform all of the essential steps in their systems work in order to optimize the use of their time and efforts.

Complete and adequate documentation should be provided and maintained for all systems projects. This documentation should be verified as being in conformance with specifications which prescribe requirements and content. Care should be taken to assure that documentation provided is in its most simple but most effective form.

The proposed Management Systems and Controls Division should, for internal control purposes, establish a library for all management and EDP systems documentation. Control logs should be used to provide full accountability, and the library should be locked when not attended by a part-time librarian.

RECOMMENDATIONS

20. Expand and utilize working standards and procedures in all systems projects.

21. Develop and use check lists in all systems projects to assure that all necessary steps are covered.

22. Require that adequate documentation is provided and maintained on a current basis for all management systems projects.

23. Establish a library for all management and EDP systems documentation and appoint a part-time librarian to control access.

(c) Planning and Development

The planning and development of total systems requirements and of each system project are critical steps in achieving effective, economical and meaningful operations.

We observed that not all essential steps are performed by the PERS in the planning of systems projects. System objectives, user requirements, legislative restrictions, and resource limitations are not adequately

determined and documented. Alternative development and operational plans are not fully evaluated and cost benefit analyses are not performed, budgets are not estimated, and development schedules are not established and kept current.

RECOMMENDATIONS

24. Determine and document objectives, user requirements, legislative restrictions, and resource limitations for all systems projects.

25. Require cost/benefit analysis, including both development and operating costs, for all proposed systems projects before approval is given for system development.

26. Establish resource requirements, budgets, and schedules for the development of all systems projects.

With the development of more advanced systems to include on-line/ real-time EDP systems, it has become imperative that adequate and effective internal controls are incorporated in all manual and EDP systems.

The current approach to the design of systems within the PERS does not place necessary emphasis upon the design of internal controls during the initial development of integrated manual and EDP systems. Serious control weaknesses and inaccuracies can and do result in major systems that are used to process large volumes of data. For example, recent experience in the automated calculation of retirement benefits has revealed that EDP records for 20 to 25 percent of the active members contain significant inaccuracies in historical pay rate and service credit data. These inaccuracies are manually detected and corrected before payment, in most cases.

In order to minimize control weaknesses and data inaccuracies in all
systems, responsibility for the systematic design of effective internal con-
trols should be assigned to the proposed Management Systems and Controls
Division.

In addition, a formal requirement should be established which requires
that all new system designs be reviewed and approved by the proposed internal
audit unit. This review should be accomplished to confirm compliance with
legislation and management policies, and to evaluate the adequacies and effec-
tiveness of internal control features before the detail systems designs are
finalized.

MAJOR RECOMMENDATION

*27. Require that all systems designs be reviewed and
approved by the proposed internal audit unit for
compliance with legislation and management policies,
and for adequate internal control features.

Presently source documents are designed by the users on a piecemeal
basis with no design standards established to provide for consistency in
design and efficiency in the use of documents.

The importance of good forms design has not been recognized by the
PERS in the overall area of systems development. For example, a wide variance
in source document forms received by the EDP key-entry group results in daily
problems and inefficiencies. Most of these forms do not incorporate design
features which would promote easier and more accurate conversion of written
data to EDP coded data.

RECOMMENDATION

28. Include the design of source document forms in the systems development effort in order to assure the effectiveness of such forms in areas such as EDP key-entry.

(d) Implementation and Evaluation

Effective implementation of systems projects can best be accomplished by careful planning of the necessary implementation and conversion steps, setting target dates, and coordinating each step. To assist in implementation, the systems design and implementation schedule should be "frozen" (within reason) at some predetermined date if the total project is to be completed on schedule and costs are to be minimized.

Evaluation of new system projects should be made following final activation of all sub-systems and after the system has been operative for several weeks or months. The purpose of these evaluations is to determine whether objectives were accomplished, needs were met, internal controls are operating, and efficiencies are attained. The results of these evaluations should be reported to management and all other involved parties in order that changes can be made if required. The proposed internal audit unit is the most appropriate organization to perform the post-evaluation of systems projects.

RECOMMENDATIONS

29. Require that detailed implementation and conversion plans and schedules be provided for all new systems projects.

30. Establish "freeze" dates for systems designs and implementation schedules.

31. Require that all implemented systems projects be evaluated by the proposed internal audit unit.

(e) Project Direction and Reporting

Currently, the PERS has no formal means of directing a total systems project and reporting progress and actual costs. In order to provide effective systems management for all projects, the proposed Management Systems and Controls Division should be given the following responsibilities:

- Selection of project leaders and assignment of analysts and user personnel to project "task force" units

- Establishment of project schedules and budgets

- Coordination of approvals

- Direction of development and implementation work

- Monitoring and reporting of progress and costs to the users and the proposed Management Systems Steering Committee.

RECOMMENDATION

32. Require the proposed Management Systems and Controls Division to direct all systems projects and monitor and report progress and costs to the users and the proposed Management Systems Steering Committee.

EDP SYSTEMS ANALYSIS

In conjunction with our proposal in Chapter IV for the assignment of EDP system analysis activities to the proposed Management Systems and Controls Division and EDP programming activities to the DPSC, the PERS should establish improved procedures for the control of programming and testing work.

This can best be accomplished by requiring the EDP systems analysts to perform the following functions:

- Provide complete EDP program design and test specifications to the DPSC to serve as a basis for programming and testing work.

- Obtain and evaluate work schedules and cost estimates from the DPSC for programming and testing work.

- Coordinate necessary approvals and issue work order authorizations to the DPSC prior to the start of programming work.

- Review and approve all coded programs prior to the start of testing.

- Review all test data prior to the start of processing.

- Monitor programming and testing progress, problems, and costs.

- Review and approve all required program revisions.

- In coordination with the proposed user control unit, control should be established over all EDP programs used for production processing.

RECOMMENDATIONS

33. Require the EDP systems analysts to provide complete
program design and test specifications to the DPSC
in advance of starting programming and testing work.

34. Require the EDP systems analysts to closely control
all EDP programming and testing work performed by the
DPSC.

35. Require the EDP systems analysts to review and approve
all required revisions to EDP programs.

EDP PROGRAMMING

As recommended in Chapter IV, programming work should be performed by
the DPSC as an EDP service to the PERS and STRS. In order to assure the
success of consolidated programming work and the realization of all previously
discussed potential benefits, the following recommended administrative controls
should be placed into effect by the DPSC:

- Require the user departments to provide the DPSC
with completed design and testing specifications
prior to the start of programming work.

- Project work schedules and estimate costs for all
programming and testing work.

- Require the users to provide work order authorization
prior to starting programming work.

- Establish effective programming and testing standards
and procedures to include a listing of all common macro
routines and micro instructions.

- Obtain the approval of the user before the start of program testing or production processing.

- Provide complete documentation for all programs to include program test procedures and test data. Maintain this documentation on a current basis.

- Establish a library for all program documentation and appoint a part-time librarian to control access.

- Require approval of the programming supervisor and the user for all program revisions. Maintain a log for all revisions.

- Monitor and report all progress, problems, and costs to DPSC management and to the users.

RECOMMENDATION

36. Establish administrative controls over programming as listed above.

In addition to placing the above recommended administrative controls into effect in the area of programming, the DPSC should also place major emphasis upon planning and implementation of the following recommended programming projects:

- Redesign, wherever practicable, the front end of existing programs to allow for direct read-in of key-entry magnetic tapes.

- Convert existing programs, wherever practicable, from 80-column card input to standard tape, record, and block format.

- Design common programs and program modules for the PERS
  and STRS wherever possible.

- Incorporate automatic job-stream balance controls in all
  recently written and future programs. Include record
  count, block count, dollar totals, hash totals, and
  check digit controls as required.

Implementation of the above-listed programming projects should
offer considerable savings in the annual costs of computer processing. Our
observations of daily computer processing work revealed that implementation
of the first two projects alone would result in the following annual cost
savings:

Potential cost savings from converting to direct
tape input and standard tape format:

Reduction in daily processing time	=	1.5 hours per day
Daily savings 1.5 hrs. x $72 per hr.	=	$108 per day
Annual savings $108 x 365 days	=	$39,400

Implementation of the last two projects could result in even greater
savings through the elimination of redundant program development work and the
early detection of errors in the processing of large volumes of data.

MAJOR RECOMMENDATION

  *37. Plan and implement the programming projects as
        listed above.

SOFTWARE SUPPORT

The software group in the DPSC performs a vital supporting role in
the interfacing of applications programs with the computer and its internal
software which consists of a complex operating system and utility programs.

An effective software effort with systematic cross communication between the software, programming, and computer operations groups is extremely important in order to assure that applications programs and processing jobs are run efficiently on the computer. The importance of an effective software effort becomes even more important as the EDP systems become more complex and on-line/real-time processing is employed.

As a means of developing a more effective software effort, the following recommended administrative controls should be placed into effect by the DPSC:

- Update and maintain on a current basis software standards and procedures for the current version of the computer operating system and all utility programs.

- Provide adequate documentation for the operating system, utility programs, and special software programs. Maintain this documentation on a current basis.

RECOMMENDATION

38. Establish administrative controls over software support work as listed above.

In addition to placing the above recommended administrative controls into effect in the area of software support, the DPSC should place major emphasis upon implementation of the following recommended software projects:

- Place increased effort on the development of software programs for reporting computer utilization,

job accounting, tape library control, and automated
scheduling of processing.

- Develop capability in the software unit for the utilization of special system simulation, software programs for the analysis of existing computer utilization, development of computer design specifications, and the evaluation of future computer and telecommunication system configurations.

- Require the software group to provide software evaluation support for the key-entry system.

- Assign responsibility to the software group to remain current on the development of new EDP hardware and input/output techniques such as Optical Character Recognition (OCR).

RECOMMENDATION

39. Plan and implement the software projects as listed above.

VI.   DATA CONTROL

As the complexity and use of data processing increases, the need for establishing a total system of effective data controls has become of paramount importance to the PERS and the DPSC.   This system of controls becomes of even greater importance as the scope of consolidated EDP operations and supporting activities is expanded.

In this chapter we present our findings and recommendations as they relate to data control.   The primary areas of discussion are scheduling, user control, EDP processing control, tape library control, and the DPSC standards and procedures manuals.

SCHEDULING

Effective scheduling of data processing is essential for achieving the joint goals of maximum throughput of data, maximum utilization of EDP resources, and minimum costs of data processing.   Even greater emphasis must be given to the improvement of long-range and short-range schedules as the use of multiprogramming increases coupled with the introduction and growth of on-line, integrated data base files.

Currently, the scheduling activities of the DPSC are limited to the preparation of the daily operations schedule, which lists jobs in order of priority.   This schedule is very informal, however, and does not contain estimates of job run time or total shift processing times, and it does not designate multiprogramming job mix assignments as a guide to the computer operators.

As an aid to scheduling, the STRS and the VA prepare monthly listings of job processing requirements and update these listings weekly. However, the PERS does not prepare a similar monthly projection of its requirements, which represent over 60 percent of the center's workload, and the DPSC does not prepare a consolidated long-range schedule.

In order to establish a firm foundation for total resource planning and monthly operations scheduling, a general one-year schedule of EDP operations should be prepared by the DPSC. This schedule should be based upon one-year projections of data processing requirements from each of the user departments and include information such as: peaks and valleys in normal processing work, program testing activities, and the effects of equipment changes. Updating of the basic user projections and this schedule should be accomplished quarterly.

A more detailed, long-term schedule should be prepared by the DPSC on a quarterly basis, showing monthly workload for proper utilization of personnel and equipment. This schedule would be of prime importance for the planning of personnel assignments, shift rotations, and vacations, and should be based upon monthly projections by each of the user departments. Updating of this schedule should be accomplished monthly.

In addition, a weekly schedule should be prepared on Thursday of each week showing the daily, shift-by-shift, processing and testing schedule. This schedule should be finalized and distributed within the DPSC and to the users on Friday prior to the next processing week, which should start on Saturday morning.

A graphical format should be developed for the weekly schedule which provides estimates of job run time and total processing time for each shift. In addition, multiprogramming job mix assignments should be developed and shown on the schedule, taking the following factors into consideration:

- Core storage requirements for each program

- Peripherals required for each program

- Running time for each program

- Job and program processing priorities.

Updating of the computer room copies of the weekly schedule should be accomplished daily through the use of overlay strips or some other means of making schedule revisions.

As the complexity of multiprogramming increases, a special software package should be developed to assist the scheduler in the analysis of job mix assignments for the weekly and daily schedules.

RECOMMENDATIONS

40. Provide the DPSC with annual, quarterly, and monthly projections of PERS data processing requirements. Update these projections quarterly, monthly, and weekly, respectively.

41. Require the DPSC to prepare annual and quarterly schedules for total resource planning. Update these schedules quarterly and monthly, respectively.

42. Require the DPSC to prepare a weekly operations schedule showing multiprogramming job mix assignments, and core

requirements, peripheral requirements, and job

run times for each shift. Update this schedule daily.

USER CONTROL

The broad concept of input/output control involves the activities of user organizations as well as those of the EDP organizations. However, the ultimate responsibility for the integrity of input, master file, and output data is the responsibility of the user. If a difference occurs between input and output controls, the user should find the error, correct it, and resubmit the batch.

The concept of user responsibility is sound, and it provides for more effective use of EDP resources and greater accuracies in data processing work.

Presently, the control of data processing is seriously inadequate and disorganized at the user level. The Accounting Division is the only user which has established formal controls for its payroll collections. To accomplish this, the Accounting Division employs the services of the EDP Division's data control group to perform its user control functions. This group is totally committed to providing control functions for the Accounting Division, having no resources to perform control functions for other user divisions except on a piecemeal basis.

As recommended in Chapter IV, a user control group should be established within the proposed Management Systems and Controls Division in order to effectively establish controls for all of the user divisions.

Following initial screening and batching by the user, all input data should be routed to this group for verification of completeness, validity, and control integrity. Before the data is sent to the DPSC for processing, this group should also complete and attach a "job transmittal form" showing all steps to be taken in processing, identification and control totals, tape files required by serial number, and processing priorities.

After computer processing the user control group should review all output data for validity, balance input controls against output totals, and make final distribution to the users. If differences are detected, the user control group should coordinate corrections with the related user divisions and provide followup control over resubmitted data. However, ultimate responsibility for the integrity of input and output data should be retained by the user divisions.

RECOMMENDATIONS

43. Route all PERS data requiring computer processing through the proposed user control group, using a "job transmittal form" to provide continuous control from input to output.

44. Require the proposed user control unit to perform the initial review and balancing of output data returned from the DPSC; however, retain ultimate responsibility for data integrity within the user divisions.

EDP PROCESSING CONTROL

The extension of user controls through data processing operations is of prime importance to the user organizations and is essential to the ultimate success of the "service center" concept of data processing. Our review has revealed that major deficiencies exist within the DPSC in the area of EDP processing controls.

Data processing job materials are presently gathered from various locations just prior to the start of processing on the computer. The responsibility for bringing job materials together is now divided among the scheduler, the "procedures" personnel, the librarians, the computer operators, and the shift supervisor. No one person or group is assigned responsibility for control, and complete control logs are not maintained for incoming and distributed data. A more systematic and efficient method is required in order to assure that all necessary job materials for processing are properly assembled, identified, controlled, and used in a job stream. This requirement will intensify as multiprogramming increases.

A more positive procedure should be developed for the assembly of well-defined, identified, and controlled job packages. For example, job packages should include the following materials:

- Job transmittal orders

- Job stream flow charts

- Operator instructions

- Control cards

- Program object decks or tapes, where required

- Master file tapes or disks, where required

- Transaction input documents, cards, tapes, or disks.

In order to provide continuity of control from input phase through to output phase, the responsibility for assembling and controlling job packages should be delegated to the proposed DPSC processing control unit. This responsibility should also include assembly of job packages for key-entry, EAM, and program testing work.

As part of a policy of tighter processing controls, the responsibility for control of all program object decks, program tapes, and disk resident programs should be reassigned from the existing procedures group to the proposed processing control unit.

Prior to making distribution of output data to the users, the proposed DPSC processing control unit should screen all completed jobs for obvious out-of-balance conditions, edit exceptions, and general integrity.

RECOMMENDATIONS

45. Implement a positive procedure within the DPSC for the assembly of all job materials into well defined, identified, and controlled job packages (include key-entry, EAM, and program testing work).

46. Reassign responsibility for control of all program object decks, program tapes, and disk resident programs from the existing procedures unit to the proposed DPSC processing control unit.

47. Require the proposed DPSC processing control unit
to screen all completed jobs for obvious out-of-
balance conditions, edit exceptions, and general
integrity prior to making distribution to the users.

TAPE LIBRARY CONTROL

To be fully effective, user control should be extended to the tape
library in order to assure control over storage, selection, and scratching
of input, masterfile, and output tapes.

Presently, the tape library is maintained by the computer operators,
and tape selection is accomplished with an index card system which cross
indexes the specific programs with the most current data tapes. This system
is working; however, control is weak and errors are common. Most importantly,
positive user control of data tapes is not provided.

In conjunction with establishing effective user and EDP processing
controls, the responsibility for control of the tape library should be
assigned to the proposed processing control unit, and the proposed job
transmittal form should be utilized to provide positive control over storage
and selection of data tapes. The card index should continue in use only as
a backup reference file to individual control logs which should be maintained
by the user control units. Ultimately, a computerized index system should be
developed to replace the card index system.

As a means of providing user control over the scratching of data
tapes, a daily computer printed listing of all tapes with expired retention

dates should be generated. Copies of this listing should be sent to each user

control unit for final review and approval before scratching the tapes.

RECOMMENDATIONS

48. Utilize the proposed job transmittal form to control

the selection of tapes by reel number for inclusion

in specific job packages.

49. Provide a daily computer printed listing of tapes which

have expired retention dates, and obtain user approvals

before scratching these tapes.

The practice of periodically cleaning magnetic tapes to remove

dust and oxide particles is not observed by the DPSC. As a result, frequent

errors in the reading and writing of tapes occur during processing.

RECOMMENDATION

50. Procure a cleaning device for magnetic tapes and establish

a procedure for the periodic cleaning of all tapes.

The DPSC has established a storage vault for the safeguarding of

backup tapes for critical masterfiles. However, our inspection of this

vault revealed the following deficiencies:

- Backup tapes are maintained for the PERS only,

not for the STRS and VA.

- Backup tapes were missing for most of the critical

PERS masterfiles.

- Backup tapes are not provided for the PERS, STRS and

VA applications programs.

-    A control log is not maintained.

-    The vault is located in a public reception area on a
     floor above the computer center. (A fire in the com-
     puter center could possibly travel up through the
     structure destroying all working and backup tapes.)

RECOMMENDATIONS

51.   Expand and enforce the requirement for remote storage
       of critical backup tapes to include all masterfile and
       program tapes for the PERS, STRS and VA.

52.   Relocate the remote storage vault for critical backup
       tapes to another location which affords reduced risk of
       fire loss of working and backup tapes.

DPSC STANDARDS AND PROCEDURES MANUALS

The responsibility for providing a standards manual is currently
assigned to the software group, and the responsibility for providing job proces-
sing procedures is assigned to the procedures group within the DPSC. The job
processing procedures are maintained reasonably current, but the standards
are incomplete and for the most part outdated.

The magnitude and complexity of the DPSC's operations require the
standards and procedures to be expanded and maintained currently, as discussed
in detail in previous and following chapters of this report. EDP standards
and procedures are closely related and in many areas are inseparable. The
procedures group has set up an effective system for coordinating, assembling,

issuing, and maintaining procedures. Therefore, it is logical that they be assigned the overall responsibility for providing effective standards and procedures manuals and specific job processing procedures for use in the DPSC.

<u>RECOMMENDATION</u>

53. Assign responsibility to the proposed standards and procedures group for coordinating, assembling, issuing, and maintaining on a current basis expanded standards and procedures manuals for use in the DPSC.

VII. DATA PROCESSING OPERATIONS

In this chapter we present our findings and recommendations as they relate to the data processing operations of the PERS and the DPSC. The primary areas of discussion are:

- Key-entry operations

- Computer operations

- Equipment maintenance.

KEY-ENTRY OPERATIONS

The PERS replaced its keypunch machines in October 1970 with an advanced key-entry system supplied by the Computer Machinery Corporation (CMC). Use of this system over several months has resulted in a significant increase in throughput with the same number of operators, while greatly reducing over-time requirements for processing input data. However, the CMC-9 system is being utilized at less than 50 percent of practical capacity, and the continued operation of this system cannot be cost-justified unless additional work is processed.

As proposed in Chapter IV, the PERS key-entry and the STRS keypunch work should be consolidated within the DPSC in order that the advanced key-entry system may be made available to both major user agencies.

Consolidated key-entry operations would increase utilization of the key-entry system. However, if the system still possesses excess capacity after absorbing the STRS keypunch work, evaluations of the practicality and cost benefits of changing to the smaller CMC-7 system should be made.

To permit changeover to a system configuration of reduced capacity and lower lease costs during the contract period, a provision should be incorporated in the renewed contract with CMC which will permit such a change.

RECOMMENDATION

54. Incorporate a provision in the renewed contract for the CMC key-entry system which will allow for changeover to a system configuration of reduced capacity and lower lease costs during the contract period.

Conversion of the STRS keypunch operation to the key-entry system will require the STRS keypunch operators to be thoroughly trained in the operation of this more sophisticated system. The supervisor of the PERS key-entry group has developed an effective training procedure. However, heavy work activity on the day shift may at times interfere with partial use of the system for training purposes. As a means of training key-entry operators during peak processing periods, assistance should be requested from the Franchise Tax Board, which operates similar equipment and has a formal training program.

RECOMMENDATION

55. Request assistance from the Franchise Tax Board in training key-entry operators during periods of heavy activity on the DPSC key-entry system.

Presently the PERS key-entry group key-verifies 100 percent of the input data. Efficiency would be greatly improved if the key-entry operators were to discontinue key-verifying non-critical data fields. Verification of

non-critical data in applications such as the "Health Benefits Questionnaire" is not essential and takes considerable time that could be used more effectively on other work.

As a means of improving efficiency, all key-entry applications should be reviewed for critical and non-critical data fields, and key-verification should be limited to critical data fields.

RECOMMENDATION

    56. Limit key-verification to critical data fields.

Consolidation of the PERS and STRS data preparation work on the key-entry system will require that internal disk storage capacity of this system be used effectively.

Presently, excess capacity permits holding "uncleared" batches of data which are awaiting completion or correction for several days, and in some cases, weeks. With an increase in work volume, this practice will result in frequent overload conditions, reducing throughput.

In order to provide as much disk space as possible for incoming jobs, the disk should be "dumped" daily to tape and uncleared batches recalled to disk as required for completion or correction.

RECOMMENDATION

    57. Dump all "uncleared" batches from disk storage in
        the key-entry system on a daily basis.

Special recognition should be given to the supervisor of the key-entry group for quickly activating and reaching a high level of production with the new key-entry system.

COMPUTER OPERATIONS

In this section we present our findings and recommendations as they relate to computer operations. The areas of discussion are the computer operator's manual, computer operator's log, operator control of processing, and console typewriter sheets.

(a) Computer Operator's Manual

Currently, the computer operator's manual consists of an operator's instruction booklet supplied by Honeywell. This booklet provides general instructions for operation of the hardware. These instructions are adequate for the most part because the supervisors are knowledgeable of the routine operations. We did, however, observe that no written procedures have been made available to the operators for many normal operations and potential emergency conditions.

The need for complete documentation would be apparent in the absence of a supervisor during a shift, and the documentation would be helpful in the training of new personnel. To be fully effective, the vendor-supplied manual should be supplemented with procedures to include the following:

- Normal operating procedures
    -- Use of utility control panels
    -- Start-up and shut-down of EDP equipment
    -- Control and labeling of input and output data

-- Safeguarding of program and data files

-- Execution of utility jobs

- Emergency procedures

RECOMMENDATION

58. Provide a supplement to the computer operator's manual
to include written procedures for all normal operations
and emergency conditions.

(b) Computer Operator's Log

The recording and reporting of all information pertaining to the
daily operation of the computer systems is vital to effective management and
good internal control.

Presently, the computer operators do not maintain a formal log.
Informal notes are made at times by some of the operators, but for the most
part, these notes are inconsistent and inadequate.

The computer operations supervisors should be required to prepare a
report of shift activities to include input/output, program, schedule, and
equipment problems. This report should be distributed to all concerned DPSC
and user management personnel on the following morning.

RECOMMENDATION

59. Require the computer operations supervisors to prepare
and distribute a daily report of shift activities and
troubles.

(c) Operator Control of Processing

During our audit we observed that the computer operators mislabel tape reels on occasion as the reels are dismounted from the tape drives.

Corrective action should be taken to prevent the recurrence of such errors. The operators should be instructed to dismount tape reels one at a time and label them after orally verifying the file designator and reel number with the console operator. The console operator should refer directly to the proposed "job transmittal" form in order to confirm the reel numbers.

RECOMMENDATION

60. Instruct the computer operators to dismount and label tape reels one at a time after orally verifying the file designator and reel number with the console operator.

(d) Console Typewriter Sheets

The computer console typewriter is the primary device for cross-communication of control instructions and messages between the operator and the computer. Our review of the console typewriter sheets resulted in the following areas of concern in the daily use of these control sheets:

- The console typewriter sheets, which can be easily separated into individual pages, are not sequentially pre-numbered for control purposes.

- The console typewriter sheets do not reflect the review, approval, or corrective action taken by the shift supervisor.

RECOMMENDATIONS

61. Utilize sequentially pre-numbered console type-
    writer sheets.

62. Require the shift supervisor to review the console
    typewriter sheets and make entries of approval or
    corrective action taken.

EQUIPMENT MAINTENANCE

At present, scheduled preventive maintenance and unscheduled emer-
gency maintenance is performed by the Honeywell service engineer, with some
minor work being accomplished by the computer operators. However, four
major problems exist in maintenance recording, communication, and payment
of billings, as follows:

- A maintenance log is not maintained by the com-
  puter operators.

- Trouble report cards are not filled out and communicated
  to the Honeywell engineer for all significant equipment
  problems.

- Maintenance billing invoices are not reviewed for validity
  and reasonableness by the DPSC manager prior to payment.

- Monthly billings for the leasing of EDP equipment are not
  reduced by an amount equal to cumulative downtime and
  rerun time associated with failures of vendor-owned
  equipment.

RECOMMENDATIONS

63. Require that all EDP equipment problems are recorded in a maintenance log and are communicated to the vendor's service engineers on trouble report cards.

64. Require that all EDP equipment lease and maintenance billing invoices are reviewed and approved by the DPSC manager prior to payment.

65. In new equipment contracts, negotiate for a reduction in monthly billings for the leasing of EDP equipment by an amount equal to cumulative downtime and rerun time when equipment malfunctions occur.

VIII. UTILIZATION, COST, AND
PERFORMANCE REPORTING

The findings and recommendations pertinent to computer utilization, cost, and personnel performance reporting are covered in this chapter. The areas of discussion are computer utilization and job reporting system, cost center accounting system, and EDP personnel performance standards.

COMPUTER UTILIZATION AND JOB REPORTING SYSTEM

Effective utilization of the computer should be of paramount importance to both DPSC and user management personnel. They should understand the capacity of the computing systems and the use of this capacity. In addition, a detailed knowledge of job processing time and equipment requirements is necessary for proper evaluation and assignment of processing costs to the users.

During the 12-month period ended June 30, 1971, the DPSC reported average monthly utilization time for the H2200 computer to be 612 hours. This represents 85 percent utilization of average monthly available time of 720 hours. As an indication of multiprogramming efficiency, the concurrent processing of at least two jobs was reported for an average of 83 percent of the average monthly utilization time of 612 hours.

Taken at face value, the reported utilization and efficiency factors would represent a high level of utilization and multiprogramming efficiency. However, our review revealed that the utilization reporting system is seriously inadequate and the reported utilization information is considerably overstated

by an undeterminable amount. This, we believe, is the result of the follow-
ing deficiencies:

- An informal and loosely-controlled method for manually
  recording wall clock time is used as a basis for the
  measurement of utilization.

- Recorded production time includes considerable idle
  time and excessive set-up time.

- Individual job run time is not recorded.

- Program test time is not reported separately from
  production time.

- Unlike other computers, the H2200 system has no internal
  circuitry for measuring total system, CPU, partition,
  channel, or peripheral use time.

Because of these deficiencies, accurate utilization and job cost
information has not been reported for effective management of the DPSC.

In an attempt to establish an effective computer utilization and
job reporting system, the DPSC leased a "time-of-day clock" sub-system
from Honeywell in May 1971. This sub-system is designed to provide automatic
logging of elapsed wall clock times for determination of job run times.

To the date of this report, the results from this sub-system
have been very disappointing. Continuing problems with the Honeywell opera-
ting system and the lack of a tape drive for utility purposes prevents the
recording of vital information. A more aggressive approach should be taken
for the resolution of the problems with the "time-of-day clock" and the develop-
ment of the computer utilization and job reporting system. This is necessary to
meet the needs of both DPSC and user management.

MAJOR RECOMMENDATION

> *66. Place top priority on the development and implemen-
>
> tation of the computer utilization and job reporting
>
> system.

When fully activated, the presently planned computer utilization
and job reporting system will possess a major limitation in its inability
to report total system, CPU, partition, channel, and peripheral use time.
These measurements are considered essential for reporting valid job accounting
information and full evaluation of computer utilization.

Continuing efforts should be made in cooperation with the computer
vendor for the development of circuitry and methods for the recording of
these important time measurements.

RECOMMENDATION

> 67. In cooperation with the computer vendor, develop a
>
> method for accurately reporting total system, CPU,
>
> partition, channel, and peripheral use time.

COST CENTER ACCOUNTING SYSTEM

All of the costs of manning, equipping, and operating a DPSC should
be borne by the users in proportion to the services received. An effective
"cost center accounting system" is required in order to assure full recovery
of incurred costs and equitable charging to the users.

At present, the DPSC does not have a cost accounting system which
can be used to accurately accumulate costs and charge the users for project
development and applications processing work.

The existing system employs fundamental methods for estimating annual budgets, charging users monthly at a fixed rate, and allocating year-end balances to the users. No project development or applications processing costs are available, variances are not reported, and pressures are not imposed upon DPSC or user organizations to critically evaluate the cost and effectiveness of the EDP services provided.

In addition, no positive assurance can be given that all charges are equitable, and no written standards and procedures have been established to provide for reporting of costs.

As a prerequisite to expansion of services, the DPSC should establish a "cost center accounting system". This system should employ "standard" costs which are adjusted for variances on a quarterly basis. Under this system, standards and procedures should be utilized to maximize the amount of direct charging by development project or processing application. Indirect and over-head costs should also be allocated to the projects or applications on a systematic basis.

Cost savings and overruns should be identified with related projects or applications and treated as "profit and loss" factors by DPSC and user management as a means of evaluating performance.

MAJOR RECOMMENDATION

*68. Place the DPSC on a cost center accounting basis by maximizing direct charging and reporting "profit and loss" factors for each development project or processing application.

EDP PERSONNEL PERFORMANCE STANDARDS

In the area of EDP personnel performance standards, the PERS has developed some basic standards for use in the selection, training, and evaluation of data-entry operators. However, performance standards have not been established for other EDP personnel categories that would facilitate objective evaluation of individual performance and development of personnel.

In order to provide necessary performance standards, the PERS and DPSC management should develop and formalize the following within their respective standards and procedures manuals:

- Formal job descriptions

- Personnel performance standards

- Methods of evaluation

- Provisions for enforcement of standards.

RECOMMENDATION

69. Develop and formalize personnel performance standards and evaluate performance of EDP personnel wherever possible.

William H. Merrifield
Auditor General

October 1, 1971